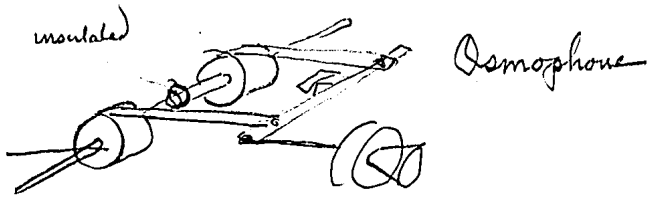
Notebook Series -- Notebooks by Edison
Notebook, N-17-01-20

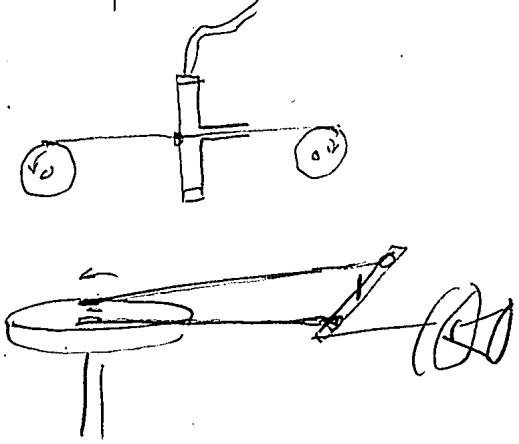
This notebook was used during January and February 1917. One additional notation is from August 1922. The entries, which are all by Edison, relate to research performed for the U.S. Navy during the World War I. The notes indicated as "entered . . . from small book" were copied from Pocket Notebook, PN-16-11-15.2. Included are experiments with electromotographs made with osmium (called "osmophones"), along with notes taken from published sources, many dealing with the photosensitivity of various chemicals. Additional entries pertain to reconnaissance methods involving light, sound, and radio waves. There are notes on night photography and night vision, including methods of keeping the pupils of rangefinder users dilated for more sensitive vision. Additional information on these night vision experiments can be found in N-17-02-06.1, Notebooks by Edison and Other Experimenters—Navy and Wartime Research Experiments. Also included are entries describing experiments with hydrogen gas detectors, methods of positioning guns in trenches, and techniques for disabling the periscopes of enemy submarines, along with speculations about "molecular vibrations." The cover is marked "Stragetic" [Strategic]. The pages are unnumbered. Approximately 40 pages have been used.

Entered Jany 20/17 from small book

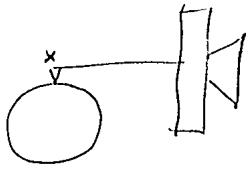
Pinacyanol + Dicyanin dyes, sensitizes photo plates for red up to 7000 line



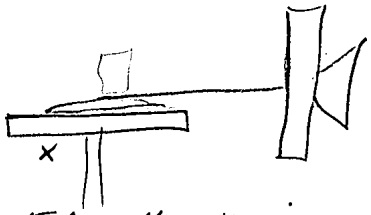
Balance friction pull on dia



Points in Osmophone – Try Conducting Silicon, Osmium iridium – (12) Iridosmine – also Carborundum + other Carbides if they Conduct & are very hard



x Tellurium point, to average of Current makes heat + slight fusion, stix a little + pulls dia –



x disc metal on this Mica, over this another disc or square of metal. Connected to Osmophone dia — passing of an Electric wave acts as Condenser + increases friction. The Mica should be extremely thin –

Trench – funnel + diaphm below water level, listen, also use microphm + also record sounds on phonograph + also 3 point recording phone 5 or 6 ft + triangulate for precision

Make very sensitive phonograph .002 dia circular cutting knife + very sensitive disc, large funnel also respondenser .0017 light weight – + Ear tubes to listen to record + micro to note waves

Polished Copper plates = One slightly oxidized in flame put both in NaCl, on plate Exposed to light. other shielded, unoxidized plate also works One exposed to light gradually turns red then purple. – Even when plates were coated with several coats of white paint Even diffused Sunlight works gives 0.1 Volt Current 0.2 amp has been obtained from a cell containing

2 plates 6" sq. 1 oxidized the other bright. Sed NY Elec Soc.
June 14 1916 12 pages -
T W Case

Diazo Compounds are very sensitive to light which induces phenolic decomposition
Even when the action of hot water or acids is slight
Some Diazo salts are stable at 0° cent decompose at 10° C
These should give good photo for radiant heat in presence of something that would give a color with the Diazo compound or decomposition product.
See Chem Soc Jul 1907 - 91 - 35
Soc Chem Industry 1890 9 1001
also for other Exceptional decomposition of Diazo Compounds Ber 1874 7 - 1061 1884 - 17 - 274
1896 - 69 - 1327 1902 - 35 - 89
Chem Soc Trans 1896 - 69 - 1327
1902 81 - 77 1905 - 87 - 5
1906 - 89 - 19 Diazos are endothermic & highly explosive

Dictionary of Applied Chem -
Vol 3 | p 220

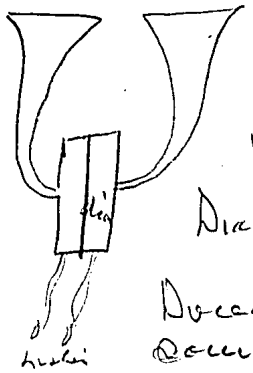
Diazotype Photography no silver used

Primuline - Diazo Process of photography
by Green & Bevan
Can get any color by using different developers | no silver used

Bain Teagh - Paraphenylenediamine hydrochloride should be good

Wireless waves are reflected by metals, from these insulators practically can reflect of corners break from a vessel -

Homatropine (Belladonna)
Could be used by Range finder men in low visibility
Also Aeroplane men, Submarine men

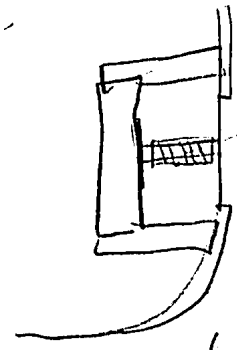


Turn –
when silence its straight ahead

Diaphram Exchange –

Deception funder for sound

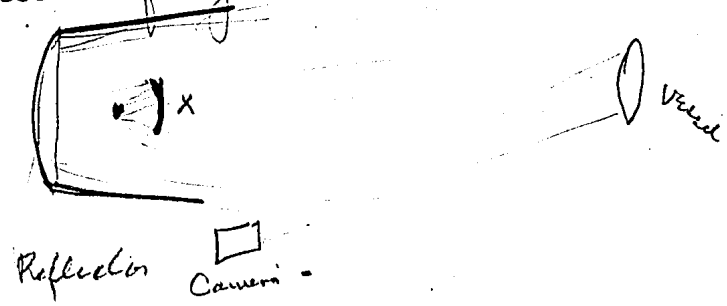
Could use microphone on Diaphram & listen to that



Dozen magnets receiving shaped powerful waves from Expansion & Contraction of Coils give powerful waves to louder, powerful

make & break Current watch.
Condenser & Compressed air
If too sluggish used Electrostatic attraction from strong wireless wave 100 000 per second

Send out the pale blue photophic waves of light in all directions



Have small guarding reflectors to prevent them seeing the arc. On dark night the pale blue light generally distributed will not be noticed if arc point is guarded by using say 6 very powerful arc & big reflectors. There should be no trouble in photoing a Dreadnaught several miles away when a person could not be seen 200 ft

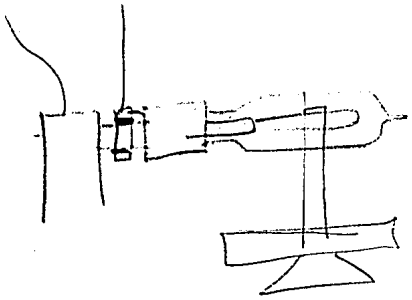
Tried this in Lab 1-18-17
works OK

Send out in air pure sound waves 12 per second & get echo by a tuned Resonator, & record on phono & speed up to make audible - or breaking up of long echo waves by vibrating diaphragm - Could use microphone These long waves would be unaffected to Enemy - or could use it under water

For positioning big Guns in trench use air waves 2 positions & for 3rd use a Piano sounding board against Earth or rock in a trench -

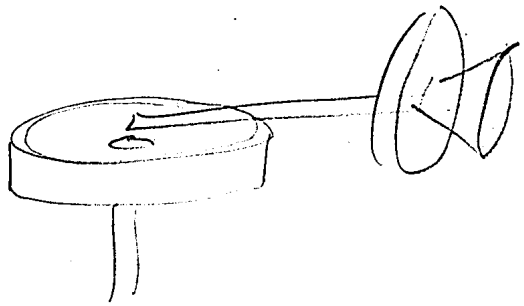
By studying with micro the waves from large guns to probable a Resonator could be adjusted to the most predominant periodic waves if any

In positioning a long gun a dia could be used very insensitive to the small guns one that is thicker & probably weighted,



*friction Motogh on Edison Effect Lamp - / wireless

also spark lines, the incoming waves vary the filler waves



Remophone using very thin discs of different Metals C -

Hydrogen Indicators —

Closed chamber a porous clay plug put submarine air in under say 3" water pressure & note how it takes pressure to equalize — use magnesium phosphorus. Try air from this air with diff % of H —

Also time of Loss of pressure when air containing hydrogen passes out thru a long Capillary glass tube,

Pass gas thru a liquid from Capillary tube - note size of bubbles or numbers per minute at constant pressure

Pass air into a glass with KOH & pyrogallic acid
Open the cock & observe the O - There will be N & H left, which left should show on index. Excess of H.

Chamber = strip of Palladium electrically heated below red - Heat now let air in - if H present it will be absorbed & index will show quickly

Chamber -

Nitride forming substance Electrically heated, This removes O + N leaving H to be read on index using KOH for CO_2 — possibly the O should be taken out by KOH + pyrogallic before Nitride is started,

Chamber having side tube containing Chlorine, pass in sufficient air open Cl tube + illuminate,

Closed chamber - pass in air of boat use spark plug - if no explosion allow H to pass in till Explosion occurs - The Extra H is the measure of safety Or use Current + Zinc anode inside chamber. Ni cathode KOH Sol - by measuring the amperes you know just how much H has

Osmophone Sound waves
250 000 second phonograph
running very high speed
shutter breaking up into dot &
dashes - Reduce speed of
phonograph to 4000 sec to hear
Echoes

Use 1/8 dia bullet & give it a
rotation so its equivalent to 1/4"
This reduces the amount of
ammunition necessary to
Carry

Belladonna, makes the Eye
exceedingly sensitive to light
In day time eye is very
insensitive to make it more
sensitive the nerves which
controls accommodation
must be paralyzed —
Hence when one sees dark

room for some time & the pupil is dilated if Homatropine is put in the eye the nerve is paralyzed & the pupil remains dilated even in bright light,

If one is in bright light & there is a haze comes up or Evening approaches, the Eye ~~Eye~~ does not become sensitive only slightly — Therefore in Naval work Range finder men should work in shifts & stay in dark rooms, using Homatropine to dilate & keep dilated the pupil of the Eye when going on duty = in this case Law visibility is very little hindrance for account of more than making up the loss by the Enormously Enhanced sensitiveness of the Eye

Homatropin Can be used

I was going to use Belladonna but
Evidently Homatropin the active principle is better

any number of times by
those under 30 yrs of age
suffering from Glaucoma

Should not be used on any Eye
until tension taken beforehand
Continuous use sometimes
results in inflammation of
the Conjunctiva

Homatropin & Cocaine drops
1/50 each would be what
is wanted - effect can
be counteracted by 1/2 % of
Eserine This acts as a
Myotic - Dilatation
requires one hour for
maximum effect, accommodation
restored in few hours by
using the Eserine

Robt G Reese MD 50 W 52nd St

where I got information as to
time of dilatation & use of Eserine

Absorption of light from an arc light in atmosphere is 10% of the whole per Kilometre

Dark light vision confused as to detail but more sensitive make specialists

I wonder if after eye has been in darkness for 2 or 3 hours a hood provided with a hood & a rotating shutter if the pupil will stay dilated so as to see better at a long distance than if no hood of eye considered,

Any disturbance of the internal vibration of a molecule causes waves to go out into space or the ether.
Heating sends out heat waves —
Light, light waves.
A charged electric sphere should send out X Y Z waves to space.
Magnetic spheres other waves also
Chemical action still others

What is wanted is a line of instruments to detect such waves & make them appreciable to one of our four senses —

In addition to the Æther of space there may be a far more attenuated gas than hydrogen in our atmosphere extending far beyond our regular N_2 O_2 CO_2 atmosphere perhaps going out millions of miles. This having a pressure independent of our present atmosphere & nothing to do with the Æther & not taking part in any transmission of Energy at 186000 miles per sec rate — Sound waves of 200000 per sec or greater might

go on the lighter gas, ~~but~~
a million per second would be
better perhaps these waves
could be obtained by disturbing
Crystals, or Double salts, or very
Complex Molecules by Electric
discharge then using Spark gap

I think that when a steamer
or submarine is in motion
that the hull is vibrated strongly
by the Engine strain or Electric
Motor & strain & that Hull
acts as a sounding board
to give the waves to the
water. Think could detect
record on phonograph & determine
Character of the Vessel by looking
at waves recorded on the
phonograph.

Sound attracts + repels light bodies
Air in a Resonator vibrating at
the mouth repels a light disc
100 000 per second may give results.

If the internal vibration of a molecule
is the source of the vibrations of light
& heat, then probably the lowest
rate will not be less than 250
Million Million per second,
between this + sound is a wide
gap — If we want to get
vibrations an entirely new series
to fill in this gap we must
heat double Salts or Complexes
The Complex should give out
a very much slower rate vibration
~~as radiation to the~~ These would
give the freq heat + light vibrations
superimposed on these would
be the vibrations of the Complex
What kind of an instrument
will detect the superimposed
vibrations of the Complex or
the Crystal? Perhaps the darkening
of photoplates through opaque screens due to
heat

Brashear make a lense for reflecting opy glass

Illuminated Chlorine loses its activity in $\frac{1}{1600}$ of a second

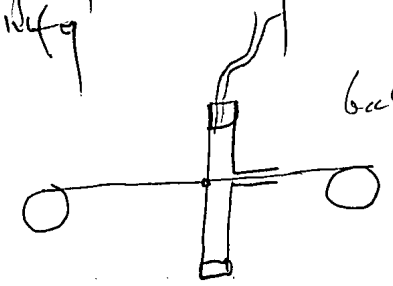
Phiotron Oscillator 50 million waves a second = Hot Cathode tubes — Jpnl Elec Review 19 771 (1916

Ultra Violet light detechrifies charged surfaces —

Should try most sensitive Balmains phosphorescent paint on glass exposed in Camera then laid on dry photo plate + let it [illegible] itself, then develope think can get rapid work in very weak light this way

The Wotograph principle either with phones + vibrating shutter or use of mirror + prism friction surfaces is going to lead to big results. All great energy changes + modifications of matter of all kinds + all wave motion take places at junctions or surfaces, + these surfaces will be so modified that there is bound to be an alteration in the functions

Why not make a dry photo plate consisting of a mix of powdered reducing agent like Pyrogallol or phenol lactic or hydrochloride + mix with the gelatin + AgBr providing it wont react in mfg



Made Aug 2 1921

Action of light on Chemicals always tends to produce compounds which have a greater Electrical Conductivity — by using a Wheatstone bridge & light shaded be able to get some very sensitive effects from light Etc —
J Gibson Zeit physikal Chem
1897 - 23 349

Phosphorescent Strontium Sulfide

Chem Soc Abstracts 1897
p 430 + also 469

With a mix of 2 hydrogen & 1 oxygen Barium Oxide at 280° Cent causes all the gas to disappear The Oxygen combines with the BaOH to form Ba Peroxide + then the Hydrogen reduces it forming water 250° C lowest temp KOH acts same way at 280 @ 300° dec in

Glass vessels Compt Rendu —
1897 125 271-275 —
Wonder if only trace of it would
act, if so good for Submarines

Action of light on large number
of Chemicals - Max Rolaff —
Zeit physikal Chem — 1898
26 - 337-361 -

By getting 300 or 400 mesh
fluorescent particles put on
surface of a fast photographic
plate with opaque particles
to fill up the spaces between
these particles would get a
very fast plate — weak light
on the accumulator principle
Developing after phosphorescence
has died out — can get salts to
fluoresce in all parts of the
spectrum - This should give outlines
of Broadnaught in very low visibility

H Rigollot Compt Rendu – 1895
121 164–166 – Action of infra red
on Silver sulfid. Uses Ag plates
sulphurized by current, in dilute
Sodium Sulphide Plate 40 mm
long 2 mm wide –
Can be traced for a distance of 60 c
distance below Visible Red –
Max EMF 0.003 to 0.004 V
Illuminated plate always negative
no matter what solution used –
Heat has very little action, but some

Luminosity of pure Organic
Compounds – Wiedemann &
Gerland Zeit physikal Chem
1895 18 529 552

Adolphe Besson Compt Rendu
121 – 125–128, Chlorinated
hydrocarbons in presence of
Oxygen decomposed by light
giving acids etc

Electrode sensitive to light.
H Luggin — Zeit physikal Chem
14 - 385 - 393, says most sensitive
yet. Plate coated with Bromide
of Silver paired with a similar
Coated silver plate in Decinormal
Solution of KBr - if defined
daylight gives 0.4 Volt,

L De Visser Rec Trav Chim 1901
20 - 435 456 -

Ba Sulfide pure dont phosphoresce
if 2 atoms of Bismuth to
100 000 of Ba Sulfide is mixed
at ordinary temp it will phosphoresce
for 1 month after exposure to light
at low temp phosphorescence not so
good but it remains for a longer
period, while at a higher temp
the reverse is the case

P Vignon — Compt Rendu 1902
134 — 902-904 — Vapors emitted by
Zinc are capable of acting on
a photo plate —

Meyer Wilderman Proc Roy Soc
1902 - 70 - 66-74 effect of
light on $CO + Cl_2$ etc accurate
measurements.

Raikow — Chem Zeit

Action of light on sublimed
Chemicals — Benzoic acid
Naphthalin Iodine, Camphor
sublimed stuff always attracted
+ goes to illuminated side of
the vessel.

Kislakowsky Zeit physikal Chem
1900 35 - 431 - 439
H_2O_2 having a few drops of ferro-cy
of K 1% H_2O_2 in dark very little
decomp — but when exposed to light
decomposition very great.

Dubois — Compt Rendu 1901
132 — 431-432. Many organic
Compounds when warmed with
alcoholic Potash yield solutions
which are luminous in the dark
+ in some cases at ordinary Temp
Essence Rosemary, Cumin, Camomile
Best results with Aesculin —
This glucoside gives a solution
which remains luminous
during a whole night
Luminosity increased when shaken
allowing air to get at it,
fluorescence destroyed by adding
Water to alcoholic solution
All these results are weaker
than with Marine Bacteria

Oscar Gros = Zeit physikal Chem
1901 – 37 – 157 – 192.

Leuco bases of a number of
Colored derivatives of Triphenylmethane
are sensitive to light, darkening
most rapidly under rose colored
glass, addition of salts.
generally increase sensitiveness
Bleaching of Dyes themselves
investigated – a long paper

Tschugaeff – Ber 1901 34 1820 1825

Triboluminescence
Crystalline substances luminous
when rubbed or struck
See Wiedemann & Schmidt. [ii] 34
446. Tried 500 organic substances
Uranium Nitrate strongest
Quinine Valerate, Cocaine
Salicylate, Cinchonamine,
Coumarin + Aniline Hydrochloride
Luminosity ceases when force
stops Except with Acetanilid +
Sulphanilic acid –

Otto Ruff + Victor Stein –
Ber 1901 — 34 — 1668 — 1684
Sensitiveness of Diazo compounds
to Light.

Murillo – Compt Rendu, 1898 127
372 – 374

Intensely phosphorescent
Strontium sulfide –
100 grms Carb Strontia
2 grms Bismuth subnitrate
2 " Sodium Carbonate
0.12 " NaCl
After moistening the soda salt
with the Sodium Salts heat to
redness then mix 21 grms
Sulphur + the Bismuth Salt
Heat to bright red for 4 hours
Its relatively stable,

Mourelo - Compt Rendu 1899
128 557-559 -

Strontium sulfide shows a more intense + persistent phosphorescence when excited by diffused daylight than when exposed to direct sunlight Ca Ba + Zn sulfides show the same peculiarity Exposure of Sr Sulfide to diffused light makes it more sensitive to subsequent exposures, - whereas Exposure to direct sunlight reduces sensitiveness & may destroy it altogether

Repeatedly Exposing Sr Sulfide for short time to diffused daylight it becomes so sensitive that Marked phosphorescence is excited by light from one candle It also shows intense phosphorescence when heated considerably below red heat

One phosphorescing Sr Sulfide will start another Sr phosphorescing

Infra red can be seen in Spectroscope up to 8000 by concentrating the light on a slit & filtering out the luminous rays by Iodine in CS_2

With mixture of Hydrogen & Chlorine it must not be exposed to light for an instant, if it is then the H & Cl will combine even in the dark increasing the temp enormously increases the sensitiveness of Compounds acted on by light,

Becquerel, studied Infra Red up to 14700. by projecting infra red on a phosphorescent screen, Compt Rendu 96.

Abney – Proc Royal Soc 35
80-81 – no ray beyond
8330 can be photographed
when air is filled with moisture

Sodio-ferric Oxalate is sol
in Water & very sensitive to
light.

Aqueous Ferric Chloride in
presence of Oxalic, Citric,
Tartaric, & other organic acids
is reduced slowly by light

Ammonium Bromide is
somewhat decomp by light
it turns yellow & there is
free hydrobromic acid &
free Bromine –

Bromide Gelatin plates are
most sensitive to pale blue
450 wave length rapidly
diminishing both ways

Sulphides of Ca Ba Sr &
Blende, are most sensitive to
rays more refrangible than
F while Alchemm &
Iceland Spar between D & F

Iodide Potash if treated with
small amount of HCl in diffused
daylight not sufficient to color
it but when in full light
turn yellow from free iodine

Mercurous Selenate Hg_2SeO_4
grayish white amorphous
precipitate obtained by adding
Selenic acid or an alkaline
selenate to Mercurous Nitrate
Very rapidly darken when
exposed even to diffused daylight

Di mercurammonium Selenate obtained by treating neutral Mercuric Selenate with strong ammonia & detaching the Selenion White Compound
Darkens when Exposed to light.

Mercuric Selenocyanate obtained by adding Potassium Selenocyanate to Mercuric Acetate: darkens on exposure to light

Wonder how Silver Salts would work,

Light acts on Cadmium yellow

J+P Curie, Compt Rendu 91
294 — 295

Development of Electric polarity by pressure in Hemihedral Crystals with inclined faces
Pyroelectric Crystals by pressure gives same effect as with heat
Blende, Sodium Chl Borocite
Tourmaline, Quartz Calamine
Topaz Dextro-Tartrate and
Sugar & Seignette Salts
Whenever a non conducting hemihedral crystal with inclined faces suffers
Contraction, Electric polarity is developed, Whenever it is dilated Elec is also developed but reversed —
Probably our heat + cold as with my old Experiment of bending hard rubber when in Contact with lips, giving heat + cold sensation.

Ethylcinchonedine obtained by treating Cinchonidine Ethiodide with potash solution – gives transparent needles quickly become red on exposure to light.
M Claus & Donnerbaum Ber 13 2187–2191 other things in same article on sensitivity to light.
also see Ber 13 – 2290 - 2294

Kahlbaum Ber 13 2348 – 2351

Methyl Acrylate, Light slowly changes it to a transparent gelatinous modification.

R Fittig – Annalen 206 – 34 – 67

Isatropic acid – Alronylene Sulphonic acid + also the Bromium salt Very sensitive to Light.

Abney Proc Roy Soc 27 291-451

AgBr is not sensitive below B
is when exposed under
Radium Sulfate sensitive to
M. (about wave length 12000)
The lowest limit yet photographed
Infra Red is very oxidizing

Jorgensen. J per Chem (2) 20 105

Chloropurpureo-Chromium
Chloride red crystalline
Powder dissolves in 154
parts of water to a violet
red solution depositing
Chromium hydroxide when
exposed to light

Photo Cells. Kunz J Franklin Inst
182-693-4-1916

Perhaps it is not the silver that gives the image in a photo, but the formation of an oxidizing compound by the action of light & on treating with pyrogallic or metol, paramedophenol or paraphenylenediamin oxidizes these reducing agents to black. Can test with electric current & prove it — should think reducing agt could be put right in the plate emulsion & it would develop & give a picture right away

Possibly no silver at all is required but chemicals which acted up by light are oxidized, or produce an oxidizing action & paraphenylenediamin or other reducing agent in present will give a positive directly & perhaps instantly so development not necessary hence bank not as a spy glass by having eye piece connected to camera

Pale blue light buoys at sea

Telefone Cable Way out at sea. Tapped at Cuttyhunk leading to shore, sound funnels connected to ~~[illegible]~~ Microphone transmitter — Off on shore can tell when ship passes over — Euchsection 10 miles Euchsude Center —

Try Charles Friends Clay in oil envelope for periscopes —

Perhaps humus dissolved in ammonia + mixed with Straw oil will be a good periscope envelope

2/ burnt mica ground in sweet oil very as leaves are separated + mixed with oil it would

probably damage the
perspective & destroy all
definition although light
could be seen through the
but it would also be valuable
for shading the surface of
the sea & as it is a good
reflector of light the
perspective & distance
could be seen greater that
a very much greater distance.

Smalt – Charcoal ground
to impalpable –
Bone black, plus lime dissolved
out by acid –
China clay
Dried Common clay } whipped up with oil & hot –
Kaolghini –
Viscose –
Rammati Indian ditto mixed
with humus –
Paper pulp ground fine & boiled in oil –

Feby 1/17
All experiments with kerosene-coal

Smudging Penscopes,

Straw oil, with coal tar put in & heated, colors deep yellow but only small % dissolves but enough to do the trick –

Kerosene alone with gilsonite in it heated spreads good but film too thin to obscure much

Straw oil & Texas Asphaltic oil heated color strong action showing dont break when wet glass shaded in. Smudges OK – WS Asphalt & Refg Co 12 Be Panuco Dist

Straw oil & Oleic acid, breaks away

Straw oil & 60 mesh ground Cuban Asphalt Sinks –

Hot straw oil & Prunia Cuban asphalt works pretty well, almost good enough no break with wet glass, smudge good Gilsonite mixed not quite so good Mixing Kerosene with this mix dont improve it.

Confetti from old newspapers boiled in oil – 1/4 mich – or coarser added & "confetti" blown on oil –

Think best way to put oil on ocean is with bug spray guns –

Oil mixed with drying oil its oxidation would dry it slowly after spraying –

Straw oil & French Talc, this works fair but segregates –

Straw oil & Rotten stone pretty fair
" China Clay only fair
" Lampblack breaks with wet glass
" Kieselguhr dont slide to glass
" Crude Trinidad asphalt works pretty good
BS in Straw oil dont color enough

It looks as if straw oil & asphalts will do the trick –